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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,958	08/17/2001	Vishnu K. Agarwal	M4065.0151/P151-B	2289

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EXAMINER

DOAN, THERESA T

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 08/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/930,958

Applicant(s)

AGARWAL ET AL.

Examiner

Theresa T Doan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2003 and 09 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 55, 57, 58, 63-71 and 124-126 is/are pending in the application.
- 4a) Of the above claim(s) 63-71 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 124 is/are allowed.
- 6) ☒ Claim(s) 55, 57-58 and 125-126 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. An action on the RCE follows.

The amendments filed on 05/21/03 and 07/09/03 have been considered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

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3. Claims 55 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Okutoh et al. (U.S. 6,180,974) as previously cited.

Regarding claim 55, Okutoh et al. teach in figure 16 a memory cell, comprising:

a substrate 221;

a transistor including a gate 222 on the substrate and a source/drain region (223/224) in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a layer comprising platinum-rhodium material **229** and a non-oxide layer **230** comprising platinum material (column 28, lines 44-45) formed on top and in contact with the platinum-rhodium layer, wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 227 providing electrical contact between the source/drain region 224 and the lateral surface of the electrode.

Regarding claim 57, Okutoh et al. teach the platinum-rhodium layer has a thickness of 100 to 500 Angstroms (column 8, lines 46-47).

4. Claims 55 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Okutoh et al. (6,201,271) as previously cited.

Regarding claim 55, Okutoh et al. teach in figure 8 a memory cell, comprising:

a substrate 1;

a transistor including a gate (3,4) on the substrate and a source/drain region 5 in the substrate disposed adjacent to the gate;

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a capacitor comprising an electrode having a layer comprising platinum-rhodium material **21** and a non-oxide layer **22** comprising platinum material formed on top and in contact with the platinum-rhodium layer, wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 19 providing electrical contact between the source/drain region 5 and the lateral surface of the electrode.

Regarding claim 57, Okutoh et al. teach the platinum-rhodium layer 21 has a thickness of 300 Angstroms (column 8, lines 63-64).

5. Claim 55 is rejected under 35 U.S.C. 102(e) as being anticipated by Uhlenbrock et al. (U.S. 6,271,131) as previously cited.

Uhlenbrock et al. teach in figure 9 a memory cell, comprising:

a substrate 112;

a transistor including a gate 124 on the substrate and a source/drain region (116/118) in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a layer comprising platinum-rhodium material 151 (column 7, lines 26-27) and a non-oxide layer 152 comprising platinum material (column 13, lines 26-28) formed on top and in contact with the platinum-rhodium layer, wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 150 providing electrical contact between the source/drain region and the lateral surface of the electrode.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okutoh et al. (6,201,271) as previously cited.

Regarding claim 58, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the platinum layer has a thickness within the range of about 50 to about 150 Angstroms in Okutoh et al.'s device, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. When the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing unexpected results or the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claim. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves

unexpected results relative to the prior art range.” In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 716.02 - 716.02(g) for a discussion of criticality and unexpected results.

8. Claim 125 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okutoh et al. (6,201,271) as previously cited in view of Shinkawata (5,717,236).

Okutoh et al. teach in figure 8 a memory cell, comprising:

a substrate 1;

a transistor including a gate (3,4) on the substrate and a source/drain region 5 in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a platinum-rhodium layer 20 provided beneath a platinum-rhodium layer 21 and a platinum layer 22 on top the platinum-rhodium layer; and

a conductive plug 19 providing electrical contact between the source/drain region 5 and the lateral surface of the electrode.

Okutoh et al. do not teach a titanium nitride layer provided beneath a platinum-rhodium layer and a platinum layer. However, Shinkawata teaches in figure 9 a barrier titanium nitride layer 15 provided beneath a platinum-rhodium layer 16 for suppressing diffusion (column 16, lines 57-67 and column 17, lines 1-2). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form a titanium nitride layer provided beneath a platinum-rhodium layer in

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Okutoh's device as taught by Shinkawata in order to prevent diffusing through the electrode.

9. Claim 126 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okutoh et al. (6,201,271).

Okutoh et al. teach in figure 8 a memory cell, comprising:

a substrate 1;

a transistor including a gate 4 on the substrate and a source/drain region 5 in the substrate disposed adjacent to the gate;

a capacitor comprising an electrode having a layer comprising platinum-rhodium material 21 and at least one layer 22 comprising platinum material (column 28, lines 43-46) on top of the platinum-rhodium layer, the platinum-rhodium 21 comprises approximately 10-20 percent rhodium (column 12, lines 14-17), wherein the electrode has a lateral surface aligned with the source/drain region; and

a conductive plug 19 providing electrical contact between the source/drain region 5 and the lateral surface of the electrode.

Okutoh et al. teach the platinum-rhodium comprises approximately 10-20 percent rhodium (column 12, lines 14-17). Okutoh et al. do not teach the platinum-rhodium comprises approximately more than 20 percent rhodium. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to apply a platinum-rhodium layer that comprises approximately more than 20 percent rhodium of instant invention in Okutoh et al.'s device, since it has been held where the claimed

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ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corporation of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Furthermore, a platinum-rhodium layer that comprises approximately more than 20 percent rhodium as claimed would have been obvious, since it has been held when the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Applicant can rebut a prima facie case of obviousness based on overlapping ranges by showing unexpected results or the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claim. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 716.02 - 716.02(g) for a discussion of criticality and unexpected results.

Reasons for Allowance

10. Claim 124 is allowed.

11. The following is an examiner's statement of reasons for allowance:

The prior art of record fails to disclose all the combination of a memory cell as claimed, including a capacitor comprising an electrode having a titanium layer beneath

a platinum-rhodium layer and a platinum layer on top of the platinum-rhodium layer, wherein a titanium nitride layer is provided beneath the titanium layer.

Response to Arguments

12. Applicant argues that Okutoh I (U.S. 6,180,974) fails to teach or suggest “a non-oxide layer comprising platinum material formed on top and in contact with the platinum-rhodium layer”. The argument is not persuasive because Okutoh I teaches in figure 16 a capacitor comprising an electrode having a layer comprising platinum-rhodium material **229** and a non-oxide layer **230** comprising platinum material (column 28, lines 44-45) formed on top and in contact with the platinum-rhodium layer 229. Examiner relies on the layer platinum-rhodium oxide **229** for platinum-rhodium material (emphasis added); Examiner is not relied on layer 228 of platinum-rhodium layer. The term “comprising” is sufficiently broad so as to embrace constructions united by means such as fastening and welding. It has long been held that the use of the term “comprising” leaves a claim open for inclusion of materials or steps other than those recited in the claims. *Ex parte Davis*, 80 USPQ 448 (PTO Bd. App. 1948). Use of the term “comprising” does not exclude the presence of other elements. *In re Hunter*, 288 F.2d 930, 129 USPQ 25 (CCPA 1961).

13. Applicant also, argues that Okutoh II (U.S. 6,201,271) fails to teach or suggest “a non-oxide layer comprising platinum material formed on top and in contact with the platinum-rhodium layer”. The argument is not persuasive because Okutoh II teaches in

figure 8 a capacitor comprising an electrode having a layer comprising platinum-rhodium material **21** and a non-oxide layer **22** comprising platinum material formed on top and in contact with the platinum-rhodium layer 21. Examiner relies on the layer platinum-rhodium oxide **21** for platinum-rhodium material (emphasis added); Examiner is not relied on layer 20 of platinum-rhodium layer. The term "comprising" is sufficiently broad so as to embrace constructions united by means such as fastening and welding. It has long been held that the use of the term "comprising" leaves a claim open for inclusion of materials or steps other than those recited in the claims. Ex parte Davis, 80 USPQ 448 (PTO Bd. App. 1948). Use of the term "comprising" does not exclude the presence of other elements. In re Hunter, 288 F.2d 930, 129 USPQ 25 (CCPA 1961).

The rest of applicant's arguments, addressed to the amended claims are considered in the rejections shown above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T Doan whose telephone number is (703) 305-2366. The examiner can normally be reached on Monday to Thursday from 8:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (703) 308-4918/4918. The fax phone

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numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TD
July 25, 2003


PHAT X. CAO
PRIMARY EXAMINER